Extraction Solutions
Extraction solution – find the perfect solution for any application

Solution finder
Find the perfect solution for your application

The classical fat determination
Soxhlet extraction after hydrolysis

Efficient hot extraction
Efficient hot extraction to determine crude fat and total fat

Chemical and industrial extractions
The greatest flexibility you can get

Residue and contaminants analysis
The best possible solution for environmental applications

“This counts…”
Benefit overview – Extraction Units E-812 and E-816
Benefit overview – Extraction Systems B-811 and B-811 LSV

Accessories

Technical data
Select your application and take advantage of Buchi’s Extraction Solutions to complete your task

Classical fat determination: analyze encased fat in food samples

Hot extraction: determine crude fat in foodstuff and feed samples

Chemical extractions: determine chemical substances in packaging and articles of daily use

Trace analysis: analyze residues and contaminants found in organic samples
## Solution finder – find the best solution for your application

<table>
<thead>
<tr>
<th>Which type of sample would you like to analyze?</th>
<th>Method applied:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze encased and bound fat in foodstuff.</td>
<td>Use a standard Soxhlet extraction after hydrolysis, for instance, Weibull-Stoldt Method, AOAC International Hydrolysis Method.</td>
</tr>
<tr>
<td>Determine the crude fat content in feedstuff and processed food (with consistent composition).</td>
<td>Perform a direct hot extraction according to Goldfisch or Randall to determine crude fat. Some samples may require a hydrolysis prior to extraction for total fat determination.</td>
</tr>
<tr>
<td>Determine ingredients in articles of daily use or packaging.</td>
<td>Use a hot extraction technique according to Goldfisch or Randall or an automated Soxhlet extraction to determine softener in packaging, organic compounds in plant tissue, etc. Inert conditions, excellent process control and automation are our strong points.</td>
</tr>
<tr>
<td>Analyze traces of pesticides in cereals.</td>
<td>Extract residues and contaminants from food and feed samples or other organic materials under inert conditions. Required detection levels can be reached due to our high sample weights.</td>
</tr>
</tbody>
</table>
Your instrument solution:

**E-416**

**E-816 SOX**

**Hydrolysis Unit B-411 or E-416**
The unit quickly and conveniently performs the hazardous hydrolysis process, including digestion and filtration. Choose between 4- or 6-place unit.

**Extraction Unit E-812 SOX or E-816 SOX**
Available as a 2- and 6-place unit; performs an automated Soxhlet extraction according to standardized methods (AOAC, § 64 LFBG).

**E-816 HE**

**E-812 HE**

**Extraction Unit E-812 HE or E-816 HE**
Choose the HE model, available as a 2- or 6-place unit, to run an automated hot extraction according to Randall or Goldfisch. Alternative: Standard Soxhlet extraction with E-812 SOX or E-816 SOX. Hydrolysis: This step can be skipped because the crude fat is accessible and can be easily extracted with a solvent.

**B-811**

**Extraction System B-811**
The best and most convenient solution – this system offers 4 different extraction techniques in one unit. Perform a Soxhlet Standard, a Soxhlet Warm, a Hot Extraction, or Continuous Flow – each process is fully automated and controlled. Additionally: work under completely inert conditions!

**B-811 LSV**

**Extraction System B-811 LSV**
This model is designed for large sample volumes (LSV) and allows you to determine traces of residues and contaminants in foodstuff, forage, soil, and plant tissue. Even difficult application tasks can be performed reliably due to a fully automated extraction process and the system's inert nature.
The classical fat determination – Soxhlet extraction after hydrolysis

The declaration of the total fat content is required by law for most foods and feeds. Time consuming procedures, use of hazardous chemicals, an increased workload, and a constant reduction of lab staff force today’s laboratories to focus on ergonomic equipment. Buchi offers a complete solution to make this task easier and faster for everyday work.

Order no.
Hydrolysis Unit E-416, 230 V  42870
Hydrolysis Unit E-416, 120 V  42871
Hydrolysis Unit E-416 V*, 230 V  44468
Hydrolysis Unit B-411, 230 V  37455
Hydrolysis Unit B-411, 120 V  37456
Hydrolysis Unit B-411 V*, 230 V  37461

* Viton

Hydrolysis principle
Most often the fat is naturally encased in the food’s and feed’s cell matrix or is chemically bound. In this case, the hydrolysis step prior to extraction becomes necessary to separate the fat completely. When heat is applied, the hydrochloric acid breaks fatty acids from glycerides, glycol- and phospholipids, and sterol ester. It also breaks lipid-carbohydrate bonds, assists in the hydrolyzing of proteins and polysaccharides, and disrupts cell walls. The hydrolyzate of the digested sample is filtrated through a glass sample tube filled with sand and celite. The filter residue containing the fat is rinsed with water to become acid-free. Finally, the filter residue is dried and later extracted.

Filtration and rinsing

Why switch from manual handling to the E-416 or B-411?
- Simultaneous hydrolysis, filtration, and rinsing of four up to six samples
- Fast and efficient filtration/rinsing
- Clean and user-friendly operation
- No odour nuisance
- Glass sample tube with frit matches the extraction units
- Complies with standardized methods (§ 64 LFBG: Weibull-Stoldt; AOAC: Acid Hydrolysis Method)

The ideal complement to the Extraction Units E-812 and E-816
The Hydrolysis Unit B-411 and E-416 ensures a safe and fast acid digestion while handling four to six samples at the same time. The powerful IR-heating is level-controlled and allows for a fast heat transfer to the digestion vessel. Since the unit is equipped with a suction tube to work under vacuum, the time for filtration and neutralization is dramatically reduced. The glass sample tube is designed to be used directly in the Extraction Unit E-812/816.
The demand for easy and fast sample preparation in quantitative analysis has prompted Buchi to develop a new extraction unit, specially designed to be in accordance with standardized methods (AOAC Official Methods, Weibull-Stoldt). The Extraction Unit E-812 SOX and E-816 SOX guarantee an original, automated and accelerated Soxhlet extraction.

1. Extraction

2. Rinsing

Optical sensor

Glass valve

Two options are available based on sample throughput

E-812 SOX

Unique: Automated and accelerated Soxhlet extraction

Cycle and time monitoring allows for unattended operation and best reproducibility (RSD < 1%). The optical sensor is adjustable based on the sample level. Due to the level adjustment, the cycle throughput is increased, which makes a real Soxhlet extraction fast and efficient. Buchi is the only manufacturer that offers an automated Soxhlet extraction unit.

3. Drying

4. Change samples

Important: Steps 1 through 3 show an automatic sequence.

2. Soxhlet extraction

After hydrolysis, the acid-free residue in the glass sample tube is dried and topped with a layer of sand. The glass sample tubes are extracted with the required solvent following the Soxhlet principle. This principle means that the solvent is evaporated, condensed, and collected in the Soxhlet glass chamber. Once the solvent level reaches the optical sensor line, the solvent is automatically released into the beaker and evaporated again.

Close to the process at any time

The clearly arranged display with self-explanatory symbols informs the operator about all important functions. Individually adjustable heating positions offer enhanced flexibility.

Order no.

Extraction Unit E-812 SOX,
100–120 V/230 V 49111
Extraction Unit E-816 SOX,
100–120 V/230 V 47581
Efficient hot extraction to determine crude fat or total fat

Crude fat is a measure of the total oil or fat content estimated by extracting a ground feed sample with diethyl ether or another solvent. A hydrolysis step prior to extraction may not always be necessary. Some food samples, for instance potato chips and mayonnaise, do not require prior hydrolysis. If the fat is not chemically bound only a direct extraction following the Randall, Goldfisch or Soxhlet extraction methods is performed.

Hydrolysis principle
Most often the fat is naturally encased in the food's and feed's cell matrix or is chemically bound. In this case, the hydrolysis step prior to extraction becomes necessary to separate the fat completely. When heat is applied, the hydrochloric acid breaks fatty acids from glycerides, glycol- and phospholipids, and sterol ester. It also breaks lipid-carbohydrate bonds, assists in the hydrolyzing of proteins and polysaccharides, and disrupts cell walls. The hydrolyzate of the digested sample is filtrated through a glass sample tube filled with sand and celite. The filter residue containing the fat is rinsed with water to become acid-free. Finally, the filter residue is dried and later extracted.

Why switch from manual handling to the E-416 or B-411?
- Simultaneous hydrolysis, filtration, and rinsing of four up to six samples
- Fast and efficient filtration/rinsing
- Clean and user-friendly operation
- No odour nuisance
- Glass sample tube with frit matches the extraction units
- Complies with standardized methods (§ 64 LFBG: Weibull-Stoldt; AOAC: Acid Hydrolysis Method)

The ideal complement to the Extraction Units E-812 and E-816
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Order no.
Hydrolysis Unit E-416, 230 V 42870
Hydrolysis Unit E-416, 120 V 42871
Hydrolysis Unit B-411, 230 V 37455
Hydrolysis Unit E-416 V*, 230 V 44468
Hydrolysis Unit B-411, 120 V 37456
Hydrolysis Unit B-414 V*, 230 V 37461
* Viton
The measurement of crude fat was an important part of the historical method of proximate analysis. Today, it is used to estimate the fat content of feeds to determine the total dietary fat level and to calculate non-fiber carbohydrate by difference.

Hot extraction process

1. **Hot extraction (HE)**
   If no hydrolysis is required, the sample is either put into the glass sample tube with frit or in the appropriate paper thimble to be extracted by a specific solvent.

or

2. **Hot extraction (HE)**
   When the extraction is performed as a second step after hydrolysis, the dried residue in the glass sample tube is inserted into the beaker and extracted by a specific solvent.

The hot extraction process always follows an AOAC approved method, which consists of three steps:

**Extraction** – this first step heats up the solvent, the sample, and glassware.

**Rinsing** – the glass sample tube or thimble is washed with fresh solvent. The optimization of rinse time, solvent volume, and time-dependent drain interval accelerates the process and cuts down the total extraction time including rinsing to just 35 minutes.

**Drying** – only a little solvent remains in the beaker which allows for a short drying time. The solvent is evaporated, condensed beneath the condenser, and transferred to the solvent tank for re-use. The extract is slowly dried while the solvent is removed.

Operation panel

**Solvent library**
Utilize the implemented solvent library (chloroform, hexane, petroleum ether, diethyl ether). Select the required solvent, and all parameters for extraction, rinsing, and drying are automatically defined. No time-consuming method development is necessary.

**State-of-the-art heating**

New technology – one heating plate, but individually adjustable heating sources
Individual adjustability allows for greater flexibility. Quick cleaning process: wiping is all that is required!

**Completely tight**

No limitations under extreme conditions
The flexible z-seal-system ensures absolute tightness even under extreme conditions. In conjunction with an excellent cooling capacity, the unit reaches an average solvent recovery of better than 90%.

Two options are available based on sample throughput

**E-812 HE**

2-place Hot Extraction unit

**E-816 HE**

6-place Hot Extraction unit

<table>
<thead>
<tr>
<th>Order no.</th>
<th>Extraction Unit E-812 HE, 100–120 V/230 V</th>
<th>49100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Extraction Unit E-816 HE, 100–120 V/230 V</td>
<td>47580</td>
</tr>
</tbody>
</table>
Chemical and industrial extractions – the greatest flexibility you can get

The Extraction System B-811 sets a new standard for solid-liquid extraction procedures. This system is highly suitable for demanding applications in chemical, industrial, and pharmaceutical analyses. Remarkable user-friendliness, practical working sequences, and time savings are the obvious strong points of this complete system solution.

Soxhlet Standard
Real Soxhlet Extraction
- The solvent in the beaker is evaporated by the lower heating element, condensed, and collected in the extraction chamber while the valve is kept closed. The glass sample tube, placed in the extraction chamber, is covered by the condensed solvent.
- Each time the solvent level reaches the optical sensor, the total solvent containing the extracted compounds is released into the beaker while the valve remains open, until the extraction chamber is fully empty. One single cycle is finished. The number of cycles and/or time defines the length of the extraction process.

Soxhlet Warm
Real Soxhlet Extraction under enhanced conditions
- The solvent in the beaker is evaporated by the lower heating element, condensed, and collected in the extraction chamber while the valve is kept closed. The glass sample tube, placed in the extraction chamber, is covered by the condensed solvent.
- Once the solvent level is detected by the optical sensor, the upper heating element is activated to heat up the solvent in the extraction chamber.
- Each time the solvent level reaches the optical sensor, the total solvent is released into the beaker while the valve remains open until the extraction chamber is empty.

Hot Extraction
Extraction process known as Randall and Goldfisch Extraction
- The solvent in the beaker is evaporated, condensed at the condenser, and collected in the extraction chamber.
- The hot extraction process is carried out once the solvent level is detected by the optical sensor for the first time and the upper heating element is activated.
- As soon as the solvent reaches the optical sensor, the valve opens for a few seconds and the hot solvent is drained. In comparison to the Soxhlet process, the glass sample tube remains in the hot solvent during the entire extraction time. During extraction, the solvent level in the extraction chamber remains at the detection line.

Continuous Flow
Washing up under controlled conditions
- The magnetic valve is opened from the beginning.
- The solvent in the beaker is evaporated by the lower heating element and condensed. During the entire process, the sample is rinsed with fresh solvent (principle of “continuous flow”).

Cycle and/or time monitoring allows for unattended operation and best reproducibility. The adjustable optical sensor detects the number of pre-defined cycles and controls the magnetic glass valve to release solvent. The cycle throughput is increased, which makes even a real Soxhlet extraction very fast and efficient.

Time monitoring allows for unattended operation. In terms of recovery and time savings, the interaction of condensation (= fresh solvent) and short drain intervals makes the hot extraction process very efficient and reproducible.

Efficient rinsing process: rinse, concentrate, and dry under fully automated conditions.
Go beyond the limits and switch to B-811

- The fully automated extraction process (extraction – rinsing – drying) is designed for unattended operation and allows for minimum system handling for up to four samples at the same time.

- B-811 provides the fastest extraction process and best mass transfer resulting from cycle/time monitoring and high end heating elements with optimized heating capacity.

- **Flexibility** allows you to apply the desired extraction technique. Choose from four different extraction techniques in one system without conversion of the glass assembly.

- **Wide application spectrum** – even high boiling point solvents (up to +150°C) can be used for the extraction process.

- **Soxhlet Standard**
- **Soxhlet Warm**
- **Hot Extraction**
- **Continuous Flow**

Unique – four different extraction techniques in one system without conversion of the glass assembly. Choose one of the four techniques based on your application!
Residue and contaminants analysis – the best possible solution for environmental applications

Environmental laboratories require excellent infrastructure for their analyses. Solvent extraction is the most commonly used sample preparation technique for determining different analytes in food, feed, soil, and sludge. In foodstuff, one differentiates between residues and contaminants. Residues usually remain after a special treatment on the foodstuff, e.g., pesticides or active pharmaceutical ingredients. However, environmental contaminants get into food products without intentional human involvement (e.g. PCBs, mycotoxins) or originate during food processing (e.g. PAH, nitrosamines).

Only Buchi offers a dedicated system that is designed for use with large sample sizes and gives the lowest detection levels of analytes – the LSV model. LSV stands for “Large Sample Volume”.

High sample throughput requirements – unattended operation combined with full automation.

Three steps, but one sequence:
- Extraction
- Rinsing
- Drying

Step 1: Extraction

The sample is placed into the glass sample tube or thimble. One of the four possible extraction procedures is applied:
- Soxhlet Standard
- Soxhlet Warm
- Hot Extraction
- Continuous Flow

Step 2: Rinsing

Once the extraction is completed, the glass valve opens and the glass sample tube is lifted up automatically. During the rinsing process, the condensed solvent washes final traces of soluble matter from the sample and from the interior of the extraction chamber.

Step 3: Drying

After the rinsing process is completed, the glass valve closes while the lower heating element remains activated. The solvent is evaporated, condensed at the condenser, and collected in the empty extraction chamber.

During processing

Inert gas such as nitrogen and/or keeping solvent is supplied if the analyte is oxygen- or heat-sensitive.

Please refer to page 10 for details.
The application configuration is the primary task – various functions allow you to easily meet different requirements. Our system is clearly the best solution for residue and contaminant analyses that require very low detection limits.

- **Optimize sample size** – with the LSV model, it is possible to increase the sample size to reach the required detection limit of the analyte. In the LSV model, main glass parts are expanded by almost 60%.

  - Beaker (Standard ✖ LSV): 150 ml ✖ 250 ml
  - Glass sample tube (Standard ✖ LSV): 130 ml ✖ 240 ml

- **Work under fully inert conditions** – all instrument components in contact with the solvent/sample/analyte are inert. Residual effects (memory-effects) are fully eliminated. This ensures no alternating blank values from emitted analyte absorbed by components or components releasing extractable ingredients.

- **Drying under inert gas** – in case of heat- and/or oxygen-sensitive analytes, inert gas is applied during processing for better recoveries.

- **Suited for a wide spectrum of applications** – even high boiling point solvents (up to 150 °C) can be used for the extraction process. Toluene and xylene are often used solvents in the environmental area.

<table>
<thead>
<tr>
<th>Order no.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>37900</td>
<td>Extraction System B-811 LSV, 230 V</td>
</tr>
<tr>
<td>37901</td>
<td>Extraction System B-811 LSV, 120 V</td>
</tr>
<tr>
<td>40549</td>
<td>Extraction System B-811 LSV, 100 V</td>
</tr>
</tbody>
</table>
“This counts…”

Benefit overview – Extraction Units E-812 and E-816

Develop an overall picture of key advantages of Buchi’s extraction solution.

- **Flexible Viton® z-seal-system ensures absolute tightness** – adapts to the flange of the beaker and Soxhlet glass chamber; tolerances are perfectly compensated for.

- **Best solvent recovery rates** – insulated tank with condenser – no unpleasant odor even with petroleum ether.

- **No “burn risk”** due to heating control. Operational safety: software displays “risk of burning” message after extraction process is finished!

- **Protection shield and smart sensors** – shield sensor controls shield position, rack must be retracted and in a down-position, and only then is it possible to begin operation. Operating errors are immediately displayed.

- **Cooling water valve with flow sensor and follow-up time.**

- **Huge, open cooling system and excellent ventilation limits explosion risk.**

- **Soxhlet rack acts like a drawer** – mobile rack allows for easy sample placement. All Soxhlet glass chambers can be moved at the same time.

- **Tank level sensor** monitors solvent level – a full tank is detected by the sensor and the user receives instructions on the display.

- **High speed heating** – every individual heating plate reaches boiling point within five minutes.

- **New heating technology with individual heating means one set point, one sensor, and one activation for each position** – maloperation of one heating position does not effect the others. The abort function also works for individual positions.

- **40 customized methods can be stored.**

- **“Skip” function** – accelerate the process whenever needed or manually intervene for fast method improvement.
Solvent library – choose your solvent and respective settings are loaded. No time-consuming application work necessary.

Ceramic surface with integrated individual heating zones – high speed, easy cleaning, no splices.

Re-use glass sample tubes and save money compared to using thimbles.

Highly shock-resistant beakers – even small fissures are compensated for by an intelligent z-seal-system.

Large cooling surface – solvent losses are minimized for best recovery rates.

Increased efficiency in an economical manner. Best solvent recovery rates (90%+) due to tank cooling and tank insulation.

Solvent library – choose your solvent and respective settings are loaded. No time-consuming application work necessary.

Adapt heating power according to your geographical data. Less power for places of high altitude, e.g. Mexico City, and more power for locations of lower altitude regions, e.g. Japan.

Quick connectors made out of PVDF allow one to attach glass frits and thimbles which supports high sample throughput. No reabsorption of solvent when compared to PTFE.

Use the E-812/816 SOX for true and automated Soxhlet extractions with cycle and/or time monitoring.

All parts are made of borosilicate glass 3.0 from SCHOTT.
“This counts…”

Benefit Overview – Extraction Systems B-811 and B-811

1. **Main power switch off** – in the event of a power supply overload or a short circuit, the main power switch turns off automatically.

2. **Overheat protection** for the lower and upper heating element.

3. **Cooling water monitoring** – if the cooling water is disconnected or the water flow is interrupted, all processes are stopped.

4. **Beaker monitoring** – at least one beaker must be in contact with the lower heating element for the position to be activated and to run an extraction. Otherwise the process cannot be started or is stopped immediately if there is no contact. If a beaker breaks, the system’s software closes the valve and terminates the affected position.

5. **Dry beaker monitoring** – if one of the beakers dries out during the extraction or rinsing process, the software turns off the related position.

6. **Protection shield** on all sides protects the operator from injury.

7. **Conversion** of “Standard” to LSV is possible and easily accomplished by simply exchanging the glass assembly. No tools needed.

8. **The process can be suspended at any time**, for instance, to release solvent into the beaker, to apply inert gas, or to extend the extraction time.

9. **Process control and reliable results** – the four heating elements work independently. If one heating element malfunctions or one of the processes needs to be suspended, all other heating elements continue to operate.

10. **Fully automated extraction process** (extraction – rinsing – drying) allows for unattended operation of four samples at the same time.
Ceramic surface with integrated individual heating elements – high speed and easy cleaning.

Re-use of glass sample tube with frit helps to reduce costs compared to disposable paper thimbles.

Large cooling surface on each position – solvent losses are minimized.

Optimized sample size – with the LSV model, it is possible to increase sample sizes to reach the required detection limit of the analyte. In the LSV model, main glass parts are expanded by almost 60% (see page 23 for details).

Wide application spectrum – even high boiling point solvents (up to +150 °C) can be used for the extraction process. Method settings for more than 200 solvents are available.

Drying under inert gas – in case of heat- and oxygen-sensitive analytes, apply inert gas for better recoveries during all steps.

Perform true and automated Soxhlet with cycle and/or time monitoring.

Inert instrument – all instrument components in contact with the solvent/sample/analyte are inert. Residual effects (memory effects) are fully eliminated.

Fastest extraction process and best mass transfer resulting from cycle/time monitoring and high-end heating elements with optimized heating capacity.

Unique – flexibility allows you to apply the desired extraction technique.

Choose from four different extraction techniques in one system without conversion of the glass assembly.

- Soxhlet Standard
- Soxhlet Warm
- Hot Extraction
- Continuous Flow
Accessories

Hydrolysis Unit B-411 and E-416

Set of digestion vessels, 300 ml (4 pcs.)
Order no. 37377

Set of glass sample tubes with frit for B-811 (4 pcs.)
Order no. 37281

Set of glass sample tubes with frit for E-812/816 (2 pcs.)
Order no. 49430

Suction tube B-411
Order no. 37387

Suction tube E-416
Order no. 42868

Sample aspiration tube
Order no. 37380

Rubber coupling, Standard
Order no. 37381

Set of stops Ø 45 mm; blind plug (4 pcs.)
Order no. 37725

Set of caps for digestion vessel; rinsing (4 pcs.)
Order no. 37463

Upper insulation plate B-411
Order no. 37416

Upper insulation plate E-416
Order no. 26736

Pair of glass tongs
Order no. 02004

Holder for digestion vessels (6 pos.)
Order no. 43039

Holder for digestion vessels (12 pos.)
Order no. 43041

Holder for glass sample tubes, PP (4 pcs.)
Order no. 37462

Holder for glass sample tubes, PTFE, micro-wavable (6 pcs.)
Order no. 51903

Water jet pump, plastic (not scope of delivery)
Order no. 02913

Vacuum hose D 10/20
Order no. 4125

Quartz sand, fat free, fire-dried at 750°C, 0.3 – 0.9 mm, 2.5 kg
Order no. 37689

Extraction Unit E-812 SOX and E-816 SOX

Set of beakers, SOX (2 pcs.)
Order no. 49427

 Soxhlet glass chamber
Order no. 47549

Valve unit, cpl. for E-812/816
Order no. 47590

Membrane with anchor for valve unit
Order no. 37534

Expansion element, PTFE for reduction of solvent volume (1 pcs.)
Order no. 51957

Additional accessories and spare parts are listed in the operation manual.
**Extraction Unit E-812 HE and E-816 HE**

Set of beakers, HE (2 pcs.)
Order no. 49426

*only to be performed by authorized service technician*

**Extraction Units E-812/816 SOX and HE**

Condenser
Order no. 47604

Condenser cover E-812
Order no. 51136

Condenser cover E-816
Order no. 51822

Beaker holder (6 pcs.)
Order no. 47643

Set of glass sample tubes with frit for E-812/816 (2 pcs.)*
Order no. 49430

Set of holders for glass sample tubes with frit for E-812/816 (6 pcs.)
Order no. 49432

Pack of paper thimbles 25 x 100 mm (4 pcs.)
Order no. 41882

Pack of paper thimbles 33 x 94 mm (4 pcs.)
Order no. 41883

Set of thimble holders, 25 x 100 mm (6 pcs.)
Order no. 49428

Set of thimble holders, 33 x 94 mm (6 pcs.)
Order no. 49429

Z-seal-system:

1. Seal holder, PVDF
Order no. 47610

2. Set of z-seals, Viton
Order no. 49431

3. Set of seals, PTFE
Order no. 49433

Holder for glass sample tubes, PP (4 pos.)
Order no. 37462

Holder for glass sample tubes, PTFE, micro-wavable (6 pos.)
Order no. 51903

Pair of glass tongs
Order no. 02004

Pliers for glass sample tube with frit
Order no. 47609

Adapter for cooling media input
Order no. 49151

*not scope of delivery*

**Chiller line**

<table>
<thead>
<tr>
<th>Solvent</th>
<th>B.p.</th>
<th>F-100/108/114 adjustment T (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroform</td>
<td>61°C</td>
<td>10°C (36°C)</td>
</tr>
<tr>
<td>Hexane</td>
<td>69°C</td>
<td>10°C (44°C)</td>
</tr>
<tr>
<td>Diethylether</td>
<td>34°C</td>
<td>5–10°C (9°C)</td>
</tr>
<tr>
<td>Petrolether</td>
<td>40–60°C</td>
<td>10°C (15–35°C)</td>
</tr>
</tbody>
</table>

1. Chiller required

Recirculating Chiller F-100 with a cooling capacity of 400 W at 10°C; cools to a fixed temperature of 10°C (to be used with one E-812 or E-816)
Order no. 220-240V, 50/60 Hz 11056460
120 V, 60 Hz
11056481

Recirculating Chiller F-108 with a cooling capacity of 800 W at 15°C; cools to temperatures of 0 to 25°C (to be used with two E-812 or one E-816)
Order no. 220-240V, 50/60 Hz 11056464
110-120 V, 60 Hz 11056465

Recirculating Chiller F-14 with a cooling capacity of 1400 W at 25°C; cools to temperatures of -10 to 25°C (to be used with two E-816)
Order no. 220-240V, 50/60 Hz 11056466
110-120 V, 60 Hz 11056467

Distribution adapter for operating two extraction units with chiller
Order no. 37742
Accessories, continued

**Extraction System B-811**

- Set of solvent beakers (4 pcs.)
  - Order no. 37276
- Set of glass sample tubes with frit (4 pcs.)
  - Order no. 37281
- Extraction chamber, Ø 52 mm
  - Order no. 36710
- Sample holder, PTFE Ø 39 mm
  - Order no. 36559
- Condensation tube, length 312 mm
  - Order no. 37482
- Condenser B-811
  - Order no. 36711

**Extraction System B-811 LSV**

- Set of solvent beakers, LSV (4 pcs.)
  - Order no. 38597
- Set of glass sample tubes with frit, LSV (4 pcs.)
  - Order no. 37663
- Extraction chamber, Ø 60 mm, LSV
  - Order no. 37902
- Sample holder, PTFE Ø 49 mm, LSV
  - Order no. 37904
- Condenser B-811, LSV
  - Order no. 36711
- LSV upgrade kit for the conversion of a B-811 into a B-811 LSV; consists of:
  1. Extraction chamber, LSV (4 pcs.)
     - Order no. 37902
  2. Holder for glass sample tubes with frit, LSV (4 pcs.)
     - Order no. 37904
  3. Condensation tube, LSV (4 pcs.)
     - Order no. 37903
Set of solvent beakers, LSV
  - Order no. 38597
Set of glass sample tubes with frit, LSV
  - Order no. 38597
LSV upgrade kit, cpl.
  - Order no. 37910

**Additional accessories**

- Magnetic valve for B-811
  - Order no. 36687
- Membrane with anchor for valve unit
  - Order no. 37534
- Holder ring for extraction chamber
  - Order no. 36709
- Set of seals for extraction chamber, PTFE (4 pcs.)
  - Order no. 37388
- Inert gas supply connection, cpl.
  - Order no. 37486
- Set of screw caps for nitrogen supply, GL10 (4 pcs.)
  - Order no. 37368
- Set of seals for extraction chamber, Viton (4 pcs.)
  - Order no. 42654
- Adapter for cooling media input
  - Order no. 49151

Additional accessories and spare parts are listed in the operation manual.
Thimble holders

1. Set of thimble holders 43 x 123 mm (4 pcs.)
   Order no. 37280

2. Set of thimble holders 33 x 94 mm (4 pcs.)
   Order no. 37279

3. Set of thimble holders 22 x 80 mm (4 pcs.)
   Order no. 37278

4. Set of thimble holders 25 x 100 mm (4 pcs.)
   Order no. 37277

Printer and accessories for B-811 and B-811 LSV

Star printer 512, serial
Order no. 48258

Printer cable IDP-460
Order no. 28468

Adapter for printer cable IDP-460
Order no. 31411

Ribbon for printer IDP-460
Order no. 38683

Ribbon for Star printer 512
Order no. 44306

Paper roll for IDP-460, Star printer 512
Order no. 38684

Chiller line

<table>
<thead>
<tr>
<th>Solvent selection</th>
<th>B.p.</th>
<th>F-100/106/114</th>
<th>Recirculating Chiller F-100 with a cooling capacity of 400 W at 10°C; cools to a fixed temperature of 10°C (to be used with one B-811 or B-811 LSV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroform</td>
<td>61°C</td>
<td>10°C (36°C)</td>
<td></td>
</tr>
<tr>
<td>Hexane</td>
<td>69°C</td>
<td>10°C (44°C)</td>
<td></td>
</tr>
<tr>
<td>Diethylether 2)</td>
<td>34°C</td>
<td>5–10°C (9°C)</td>
<td></td>
</tr>
<tr>
<td>Petrolether</td>
<td>40–60°C</td>
<td>10°C (15–35°C)</td>
<td></td>
</tr>
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</table>

2) Chiller required

<table>
<thead>
<tr>
<th></th>
<th>Order no.</th>
<th>230V, 50/60 Hz</th>
<th>11056460</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>120 V, 60 Hz</td>
<td>11056461</td>
</tr>
</tbody>
</table>

Recirculating Chiller F-108 with a cooling capacity of 800 W at 15°C; cools to temperatures of 0 to 25°C (to be used with one B-811 or one B-811 LSV)

<table>
<thead>
<tr>
<th></th>
<th>Order no.</th>
<th>220-240V, 50/60 Hz</th>
<th>11056464</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>110-120V, 60 Hz</td>
<td>11056465</td>
</tr>
</tbody>
</table>

Recirculating Chiller F-114 with a cooling capacity of 1400 W at 15°C; cools to temperatures of -10 to 25°C (to be used with two B-811 or two B-811 LSV)

<table>
<thead>
<tr>
<th></th>
<th>Order no.</th>
<th>220-240V, 50/60 Hz</th>
<th>11056466</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>110-120V, 60 Hz</td>
<td>11056467</td>
</tr>
</tbody>
</table>

Distribution adapter for operating two extraction units with chiller

Order no. 37742

Additional accessories and spare parts are listed in the operation manual.
## Technical data

### Extraction Unit

<table>
<thead>
<tr>
<th></th>
<th>E-812 SOX</th>
<th>E-816 SOX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mains voltage</strong></td>
<td>100–120 V/220–240 V ±10 %</td>
<td>100–120 V/220–240 V ±10 %</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>700/1200 Watt</td>
<td>1950/1200 Watt</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td><strong>Ambient conditions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>For indoor use only</td>
<td>For indoor use only</td>
</tr>
<tr>
<td><strong>Altitude</strong></td>
<td>5–40 °C up to 2000 m</td>
<td>5–40 °C up to 2000 m</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>maximum relative humidity 80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40 °C.</td>
<td></td>
</tr>
<tr>
<td><strong>Installation category</strong></td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>IP20</td>
<td>IP20</td>
</tr>
<tr>
<td><strong>Degree of pollution</strong></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Beaker volume</strong></td>
<td>130 ml</td>
<td>130 ml</td>
</tr>
<tr>
<td><strong>Volume of glass sample tube</strong></td>
<td>115 ml</td>
<td>115 ml</td>
</tr>
<tr>
<td><strong>Volume of Soxhlet glass chamber</strong></td>
<td>190 ml</td>
<td>190 ml</td>
</tr>
<tr>
<td><strong>Max. cooling water consumption</strong></td>
<td>72 l/h</td>
<td>72 l/h</td>
</tr>
<tr>
<td><strong>Max. water pressure</strong></td>
<td>4 bar</td>
<td>4 bar</td>
</tr>
<tr>
<td><strong>Dimensions (W x H x D)</strong></td>
<td>275 x 776 x 456 mm</td>
<td>635 x 776 x 456 mm</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>21 kg</td>
<td>36 kg</td>
</tr>
</tbody>
</table>

### Recirculating Chiller

<table>
<thead>
<tr>
<th></th>
<th>F-100</th>
<th>F-108</th>
<th>F-114</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power consumption (max.)</strong></td>
<td>850W</td>
<td>1350W</td>
<td>1850W</td>
</tr>
<tr>
<td><strong>Supply voltage</strong></td>
<td>230 VAC ±10%</td>
<td>230 VAC ±10%</td>
<td>230 VAC ±10%</td>
</tr>
<tr>
<td></td>
<td>115 VAC ±10%</td>
<td>115 VAC ±10%</td>
<td>115 VAC ±10%</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>No Display</td>
<td>Digital, Resolution 0.1 K</td>
<td>Digital, Resolution 0.1 K</td>
</tr>
<tr>
<td><strong>Overvoltage category</strong></td>
<td>II</td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td><strong>Dimensions W x H x D [mm]</strong></td>
<td>280 x 400 x 500</td>
<td>400 x 500 x 580</td>
<td>400 x 500 x 660</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>29 kg</td>
<td>40 kg</td>
<td>42 kg</td>
</tr>
<tr>
<td><strong>Cooling at 15°C</strong></td>
<td>500 W</td>
<td>500 W</td>
<td>500 W</td>
</tr>
<tr>
<td><strong>Temperature range</strong></td>
<td>Fix +10°C</td>
<td>-10°C … +25°C</td>
<td>-10°C … +25°C</td>
</tr>
<tr>
<td><strong>Working range</strong></td>
<td>Fix +10°C</td>
<td>+ 0°C … +25°C</td>
<td>-10°C … +25°C</td>
</tr>
<tr>
<td><strong>Refrigerant</strong></td>
<td>R134</td>
<td>R134</td>
<td>R134</td>
</tr>
<tr>
<td><strong>Hysteresis</strong></td>
<td>±2 K</td>
<td>±1 K</td>
<td>±1 K</td>
</tr>
<tr>
<td><strong>Tank volume</strong></td>
<td>3 l</td>
<td>5 l</td>
<td>8 l</td>
</tr>
<tr>
<td><strong>Hose connection</strong></td>
<td>9.5 mm</td>
<td>9.5 mm</td>
<td>13.5 mm</td>
</tr>
<tr>
<td><strong>Pump capacity</strong></td>
<td>0.6 bar</td>
<td>0.6 bar</td>
<td>1 bar</td>
</tr>
<tr>
<td><strong>Flow rate</strong></td>
<td>2.5 l/min</td>
<td>3 l/min</td>
<td>11 l/min</td>
</tr>
</tbody>
</table>
## Extraction Unit

<table>
<thead>
<tr>
<th>Feature</th>
<th>E-812 HE</th>
<th>E-816 HE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains voltage</td>
<td>100–120 V/220–240 V ±10%</td>
<td>100–120 V/220–240 V ±10%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>700/1200 Watt</td>
<td>1950/1200 Watt</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Ambient conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>For indoor use only 5–40 °C</td>
<td>For indoor use only 5–40 °C</td>
</tr>
<tr>
<td>Altitude</td>
<td>up to 2000 m</td>
<td>up to 2000 m</td>
</tr>
<tr>
<td>Humidity</td>
<td>maximum relative humidity 80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40 °C.</td>
<td></td>
</tr>
<tr>
<td>Installation category</td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP20</td>
<td>IP20</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Beaker volume</td>
<td>260 ml</td>
<td>260 ml</td>
</tr>
<tr>
<td>Volume of glass sample tube</td>
<td>115 ml</td>
<td>115 ml</td>
</tr>
<tr>
<td>Max. cooling water consumption</td>
<td>72 l/h</td>
<td>72 l/h</td>
</tr>
<tr>
<td>Max. water pressure</td>
<td>4 bar</td>
<td>4 bar</td>
</tr>
<tr>
<td>Dimensions (W x H x D)</td>
<td>275 x 596 x 456 mm</td>
<td>635 x 596 x 456 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>18 kg</td>
<td>30 kg</td>
</tr>
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</table>

## Recirculating Chiller

<table>
<thead>
<tr>
<th>Feature</th>
<th>F-100</th>
<th>F-108</th>
<th>F-114</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption (max.)</td>
<td>850W</td>
<td>1350W</td>
<td>1850W</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>230 VAC ±10%</td>
<td>230 VAC ±10%</td>
<td>230 VAC ±10%</td>
</tr>
<tr>
<td></td>
<td>115 VAC ±10%</td>
<td>115 VAC ±10%</td>
<td>115 VAC ±10%</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Display</td>
<td>No Display</td>
<td>Digital, Resolution 0.1 K</td>
<td>Digital, Resolution 0.1 K</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II</td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td>Dimensions W x H x D [mm]</td>
<td>280 x 400 x 500</td>
<td>400 x 500 x 580</td>
<td>400 x 500 x 660</td>
</tr>
<tr>
<td>Weight</td>
<td>29 kg</td>
<td>40 kg</td>
<td>42 kg</td>
</tr>
<tr>
<td>Cooling at 15°C</td>
<td>500 W</td>
<td>500 W</td>
<td>500 W</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Fix +10°C</td>
<td>-10°C ... +25°C</td>
<td>-10°C ... +25°C</td>
</tr>
<tr>
<td>Working range</td>
<td>Fix +10°C</td>
<td>+ 0°C ... +25°C</td>
<td>-10°C ... +25°C</td>
</tr>
<tr>
<td>Refrigerant</td>
<td>R134</td>
<td>R134</td>
<td>R134</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>±2 K</td>
<td>±1 K</td>
<td>±1 K</td>
</tr>
<tr>
<td>Tank volume</td>
<td>3 l</td>
<td>5 l</td>
<td>8 l</td>
</tr>
<tr>
<td>Hose connection</td>
<td>9.5 mm</td>
<td>9.5 mm</td>
<td>13.5 mm</td>
</tr>
<tr>
<td>Pump capacity</td>
<td>0.6 bar</td>
<td>0.6 bar</td>
<td>1 bar</td>
</tr>
<tr>
<td>Flow rate</td>
<td>2.5 l/min</td>
<td>3 l/min</td>
<td>11 l/min</td>
</tr>
</tbody>
</table>
## Technical data

<table>
<thead>
<tr>
<th>Hydrolysis Unit</th>
<th>B-411</th>
<th>E-416</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption</td>
<td>1100 Watt</td>
<td>1100 Watt</td>
</tr>
<tr>
<td>Mains voltage</td>
<td>230 V = ±10%, 50/60 Hz</td>
<td>230 V = ±10%, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>120 V = ±10%, 50/60 Hz</td>
<td>120 V = ±10%, 50/60 Hz</td>
</tr>
<tr>
<td>Ambient conditions</td>
<td>For indoor use only</td>
<td>For indoor use only</td>
</tr>
<tr>
<td>Temperature</td>
<td>10–40 °C</td>
<td>10–40 °C</td>
</tr>
<tr>
<td>Altitude</td>
<td>up to 2000 m</td>
<td>up to 2000 m</td>
</tr>
<tr>
<td>Humidity</td>
<td>maximum relative humidity 80% for temperatures up to 30°C</td>
<td></td>
</tr>
<tr>
<td>Installation category</td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Dimensions (W x H x D)</td>
<td>275 x 570 x 600 mm</td>
<td>275 x 570 x 600 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 13.5 kg</td>
<td>approx. 13.5 kg</td>
</tr>
</tbody>
</table>
### Extraction System

<table>
<thead>
<tr>
<th>Feature</th>
<th>B-811 Capacity</th>
<th>B-811 LSV Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>1250 W</td>
<td>1250 W</td>
</tr>
<tr>
<td>Mains voltage</td>
<td>230 V = ±10%, 50/60 Hz</td>
<td>230 V = ±10%, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>120 V = ±10%, 50/60 Hz</td>
<td>120 V = ±10%, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>100 V = ±10%, 50/60 Hz</td>
<td>100 V = ±10%, 50/60 Hz</td>
</tr>
<tr>
<td>Beaker volume</td>
<td>150 ml</td>
<td>250 ml</td>
</tr>
<tr>
<td>Volume of glass sample tube</td>
<td>130 ml</td>
<td>240 ml</td>
</tr>
<tr>
<td>Volume of extraction chamber</td>
<td>250 ml</td>
<td>340 ml</td>
</tr>
<tr>
<td>Length of condenser tube</td>
<td>312 mm</td>
<td>291 mm</td>
</tr>
<tr>
<td>Diameter of sample holder</td>
<td>39 mm</td>
<td>49 mm</td>
</tr>
<tr>
<td>Max. cooling water consumption</td>
<td>60 l/hour</td>
<td>60 l/hour</td>
</tr>
<tr>
<td>Max. water pressure</td>
<td>6 bar</td>
<td>6 bar</td>
</tr>
<tr>
<td>Dimensions (W x H x D)</td>
<td>600 x 290 x 980 mm (with extended condenser holder)</td>
<td>600 x 290 x 980 mm (with extended condenser holder)</td>
</tr>
<tr>
<td></td>
<td>600 x 290 x 830 mm (during operation)</td>
<td>600 x 290 x 810 mm (during operation)</td>
</tr>
<tr>
<td>Weight</td>
<td>32 kg</td>
<td>32.5 kg</td>
</tr>
<tr>
<td>Interface</td>
<td>RS 232</td>
<td>RS 232</td>
</tr>
</tbody>
</table>

### Recirculating Chiller

<table>
<thead>
<tr>
<th>Feature</th>
<th>F-100 Capacity</th>
<th>F-108 Capacity</th>
<th>F-114 Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption (max.)</td>
<td>850W</td>
<td>1350W</td>
<td>1850W</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>230 VAC ±10%</td>
<td>230 VAC ±10%</td>
<td>230 VAC ±10%</td>
</tr>
<tr>
<td></td>
<td>115 VAC ±10%</td>
<td>115 VAC ±10%</td>
<td>115 VAC ±10%</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Display</td>
<td>No Display</td>
<td>Digital, Resolution 0.1 K</td>
<td>Digital, Resolution 0.1 K</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II</td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td>Dimensions W x H x D [mm]</td>
<td>280 x 400 x 500</td>
<td>400 x 500 x 580</td>
<td>400 x 500 x 660</td>
</tr>
<tr>
<td>Weight</td>
<td>29 kg</td>
<td>40 kg</td>
<td>42 kg</td>
</tr>
<tr>
<td>Cooling at 15°C</td>
<td>500 W</td>
<td>500 W</td>
<td>500 W</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Fix +10°C</td>
<td>-10°C ... +25°C</td>
<td>-10°C ... +25°C</td>
</tr>
<tr>
<td>Working range</td>
<td>Fix +10°C</td>
<td>+ 0°C ... +25°C</td>
<td>-10°C ... +25°C</td>
</tr>
<tr>
<td>Refrigerant</td>
<td>R134</td>
<td>R134</td>
<td>R134</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>±2 K</td>
<td>±1 K</td>
<td>±1 K</td>
</tr>
<tr>
<td>Tank volume</td>
<td>3 l</td>
<td>5 l</td>
<td>8 l</td>
</tr>
<tr>
<td>Hose connection</td>
<td>9.5 mm</td>
<td>9.5 mm</td>
<td>13.5 mm</td>
</tr>
<tr>
<td>Pump capacity</td>
<td>0.6 bar</td>
<td>0.6 bar</td>
<td>1 bar</td>
</tr>
<tr>
<td>Flow rate</td>
<td>2.5 l/min</td>
<td>3 l/min</td>
<td>11 l/min</td>
</tr>
</tbody>
</table>
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